

Volume in drive A is NU AE 4.5 1

Directory of A:\ *as of 7/29/91*

DIRFIX	DOC	3891	9-07-90	11:14a
RMVENC	DOC	1257	9-11-90	9:44a
ENCGEN	DOC	2841	9-07-90	2:17p
ASNENC	DOC	2036	9-11-90	9:45a
ENCMRG	DOC	2083	9-11-90	10:16a
LOGLIST	DOC	2081	8-16-90	4:44p
PG1	DOC	3104	1-04-80	12:08a
EDR	DOC	2368	8-17-90	1:55p
OUTLINE	DOC	1624	1-15-90	4:23p
USERMAN	DOC	3319	1-20-90	8:46p
VLOG	DOC	1903	9-11-90	10:03a
PROD	DOC	2153	8-17-90	1:51p
REF	DOC	931	1-04-80	1:17a
STAG	DOC	2224	8-17-90	1:43p
RMVEDR	DOC	1923	9-11-90	9:32a
EDRLOG	DOC	4984	9-11-90	9:59a
EDRLIST	DOC	1906	9-07-90	11:27a
EDRSAVE	DOC	7041	9-11-90	9:52a
DSET	DOC	1884	1-04-80	12:31a
EM87	DOC	1219	9-02-89	1:10a
PLTM	DOC	4030	1-04-80	10:26a
DBM	DOC	4556	9-11-90	9:56a
EDR1600	DOC	2339	9-07-90	11:24a
ENTRO	DOC	5274	8-17-90	1:45p
ENCIT	DOC	3136	9-11-90	10:25a
MAN	DOC	47682	9-24-90	9:27a
ALTBK	DOC	3034	9-13-90	6:50p
REDOLIB	DOC	1487	9-24-90	8:58a
COPYSEDR	DOC	2486	10-12-90	2:29p
TRAJEC	DOC	1703	10-12-90	9:48a
JPL	DOC	2197	10-26-90	9:20a
LISTTRJ	DOC	1283	11-15-90	10:54a
PRDCTRJ	DOC	976	11-15-90	11:07a
CITRMAKE	DOC	1367	11-16-90	9:06a
ZMJOK	DOC	931	5-07-91	10:13a
RUNEDIT	DOC	4173	1-09-91	10:59a
OWLLST	DOC	1271	1-11-91	3:13p
OWLTREAD	DOC	870	1-09-91	11:42a
OWLT	DOC	1739	1-09-91	11:26a
RESUME	DOC	7014	2-05-91	6:11p
LSELECT	DOC	1338	1-09-91	8:53a
VOLDATE	DOC	518	1-09-91	9:18a
TIMVOL	DOC	826	1-09-91	9:19a
OWLTPRE	DOC	1179	1-14-91	2:25p
ENXXXX	DOC	1779	2-08-91	3:08p
RMVCIT	DOC	1155	2-13-91	4:07p
RMVWRK	DOC	1158	2-13-91	4:11p
ASSIGN	DOC	1461	2-13-91	4:28p
OWLTV1N	DOC	1088	1-14-91	2:48p
OWLTV12	DOC	1591	1-14-91	3:25p
ENXX	DOC	1376	1-28-91	1:48p
LIBCOPY1	DOC	5342	5-07-91	1:36p
ENCOPY1	DOC	3930	5-07-91	1:06p
BACKUP	DOC	2836	5-07-91	1:39p
BACKUPS	DOC	1999	5-07-91	12:31p
RECOVER	DOC	1188	5-07-91	1:54p
SPA	DOC	1719	6-03-91	4:31p
MONFLX	DOC	1451	6-05-91	9:05a

PRODUCTION:

Edrsave  
Encgen  
Encit  
Encmrg

PRODUCTION SUPPORT:

Citrmake  
Edrl600  
Jpl  
Loglist  
Lselect - *listed*  
Owlt  
Runedit  
Timvol  
Trajectory  
Vllog  
V2log  
Voldate

PRODUCTION MAINTENANCE:

Asnenc  
Assign  
Edrlog  
Rmvcit  
Rmvedr  
Rmvenc  
Rmvwrk

LOG MAINTENANCE:

Altblk  
Dirfix  
Redolib

TAPE SUPPORT:

Tlsrep  
Tlsup2

BACKUPS:

Copyenc  
Copylib

DOCUMENTATION:

Editredr  
Vlbkinfo  
Vltrjinf  
Vltrjinf  
V2bkinfo

## Outline

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  - Format.
  - Information gained.
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  - Format.
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  - Tape disposition.
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Printout and removal from TLS.  
Shipping of tape.

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## OUTLINE

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    - 1.1.2 V1log and V2log. Format.
  - 1.2 Data base maintenance programs.
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    - 1.2.2 Adding and removing LIB, ENCY, CIT tapes and cartridges.
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  - 2.3 ENCGEN. Format, log effect and listing interpretation.
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## Prologue

This document is the Voyager Data Technician production guide. It is meant to introduce the new data technician to the production process and be a guide to help the data technician start production as soon as possible. The data technician is expected to maintain this document and, if possible, add to it when required.

## Introduction

The data technician will be using the IBM 3081 operating under MVS/XA TSO. Communication with the mainframe is via terminal over the GSFC ROLM network. Information on these topics may be obtained from the MVS/TSO user guide, the user guide for the terminal model, and the CONSULT articles for network communication.

Other information of interest to the data technician will be found in the user guides for the PDF environment and the various editors available on the system. Assistance on these and other topics may be obtained from the Technical Assistance Group, (TAG), located in room S201 of building 28, extension 69120.

The job of the data technician is to process data, from tapes sent by JPL, into an encyclopedia of data and provide analysis for research scientists. The production process involves discreet steps that must be checked to ensure data integrity. Work also involves support tasks such as backup of tapes, trajectory updates, etc..., all of which will be covered in other sections of this manual.

Analysis will involve providing some quality control over the data, and producing listings and plots for the scientists. This will also require hand updating of some data sets. Further information may be found in reference 1, including a pictorial representation of the production process.

## The Voyager Log

The status of production for each tape from JPL is kept in a data base with the data set name of 'SB#VG.LOG.DATA'. 'SB#VG.LOG.DATA' is the catalog for the Voyager space craft. The catalog is divided into a log for each space craft. Each log is divided into 5 sections; the EDR section, the library section, the work section and the CIT section. Each section has a control block and data blocks. The blocks correspond to records with individual fields corresponding to words in the block.

Each block type is connected by block numbers to the previous and next block of the same type. This forms a two way linked list of blocks. This information is important when the data base requires altering or in tracing the path of the data through the production process. The data base will be discussed further when the programs for the extraction of information are discussed. Do not be worried by unfamiliar terminology at this time.

The EDR section will hold the information for the EDR tapes. The TLS slot range for the EDR tapes appear in the control block. These slot numbers are where the EDR tapes are physically placed. The EDR block tell when the tape was assigned to the log, the tape volume name, the date the tape was received, the library block number resulting from the next stage of production and more.

The library section holds the location of the files derived from the first production step. It also shows the time period covered by the data, the file number of the library tape cartridge and the work block number assigned to the data after the next step in the production process.

The work section will list the library block number for the files that are to be merged into the encyclopedia. The record numbers for the data are also found here, (encyclopedia volume numbers).

The encyclopedia section will show the location of the data, the time and record interval of the data and how much data is on a tape cartridge.

The CIT section basically shows the last tape used to create a copy of the encyclopedia for the California Institute of Technology.

Using this information, the data technician can trace the path of the data through the production process. Starting with the EDR tape label, (name), look the label up in the EDR section. Get the associated library block number and proceed to the library section.

Locate the library block number and find the associated work block number. Proceed to the work block section.

Locate the work block number and note the start/stop times and records. Proceed to the encyclopedia section.

Search for the start/stop times and records in the encyclopedia block section. When the proper range of start/stop times and records have been found, the associated encyclopedia tape volume number has the data from the EDR tape stored on it.

The data technician can trace the data backwards by proceeding in the reverse order from a start/stop time and records interval to an EDR tape.

## LOGLIST

### SB#VG.LIB.CLIST

FORMAT: ex 'sb#vg.lib.clist(loglist)'

This is a prompt driven, interactive program used to list the current status of production for EDR tapes and the data derived from them in the Voyager data base. This data base is the tape log for the Voyager space crafts as described previously.

The program will allow you to list options once per run. After selection is made the program will prompt you for the satellite ID. The ID will be either voyager-1 or voyager-2. Note the absence of blank spaces in the IDs.

The program will give you:

- the status of EDR and CIT tapes, (these tapes will be discussed later).
- how many tapes are left for use in a given process.
- a list of back log work for a given process.
- a list of incomplete processes.
- a block list of processes.
- a hexadecimal dump of the log.

A printout of the requested information will be produced at the option of the user. The program is terminated by replying to a prompt with the two characters " /\* ". The program is used by the two procedures V1LOG and V2LOG to produce block lists for the two space craft.

The options given are:

- 01 - Display EDR tapes marked for removal.
- 02 - Display CIT tapes marked for removal.
- 03 - # tape serials remaining in some controls.
- 04 - Back log on a given process.
- 05 - Incomplete processes.
- 06 - Listall by blocks.
- 07 - Hex dump of the log.

## List Catalog

EX 'SB#VG.LIB.CLIST(lstcat)'

LSTCAT is a menu clist driven clist that will allow the user to produce a log listing for one or both Voyager space craft. LSTCAT uses the member SB#VG.LIB.CLIST(subcr) to edit either SB#VG.LIB.CNTL(vllog) or (v2log) depending on the space craft. The job is then submitted to the system at run class 0. The output of the job is then placed in the users hold que for review. The resulting log list may be viewed via PDF panel 8.s.h

## V1LOG V2LOG

SB#VG.LIB.CNTL(v1log)  
SB#VG.LIB.CNTL(v2log)

The JCL in these members will submit a log list for the Voyager space craft indicated. V1LOG and V2LOG are usually edited by SB#VG.LIB.CLIST(subcr). They can be copied to the users LIB.CNTL if hand editing is required. V1LOG and V2LOG use option 6 of the LOGLIST program to produce a printout of the voyager log. The printout is placed in the users hold que for review.

## Production Processing

The production process consists of a series of programs that are designed to extract, reduce and archive data from the Voyager space craft for the Cosmic Ray Experiment. An overview of the steps involved in the production process are pictorially presented in Ref.1, Fig.11, Page 40 and more fully in Ref.1, Fig.12, Page 46. The steps are, basically, to receive the data, to save the data to a library file and generate an encyclopedia entry to merge into an existing encyclopedia of data for the space craft. The last step, not shown in the illustrations, is to produce a tape, for the California Institute of Technology, from the encyclopedia.

Before production begins, the data technician should be sure enough resources are available to complete the production run for each space craft. By reviewing log print outs and consulting the Tape Library System data base, the data technician may verify the presence of the resources. The number of EDR tape slots should be greater than or equal to the number of EDR tapes to be assigned. The next available library serial number should be hanging in the Tape Library System. At least one un-used encyclopedia tape should be available in the Tape Library System. Three CIT tapes should be labeled and hanging in the Tape Library System.

If resources aren't available, the data technician must remove, assign and label the tapes or tape cartridges required for the production run. If the log requires modification to keep current with the resources to be used, the log should be backed up first.

The production process starts with assigning the EDR tape to the log. The data is then saved to a library file, the library file is copied to a working scratch tape. The work tape file is then merged with the existing encyclopedia onto a new encyclopedia tape. The final step is to then copy the encyclopedia file onto a CIT tape and mail the CIT tape off.

The production steps are implemented from the data set SB#VG.LIB.CLIST via data set members EDRAVE, ENCGEN, ENCRMG and ENCIT. Each step in the production process produces a listing and has an effect on the space craft catalog. The listings should be checked to verify data integrity in the final encyclopedia merge. If a problem is found, the production process must be halted until the problem with the data has been corrected. What to look for in the printouts and the effect the procedures have on the log will be discussed with each program step.



## Experiment Data Record Tape

Experiment data record, (EDR), tapes are received from the Jet Propulsion Laboratory, (JPL), for processing by the data technician. This is a 9 inch reel of tape using standard label, (SL), format at a density of 1600 bits per inch, (BPI), density code 3.

SL is a tape header type used by IBM to hold information regarding the tape content. The BPI simply means that 1600 logical ones or zeroes are recorded on one inch of tape surface. The density code refers to the BPI and is a code used by the tape drive controller to set the tape drive to read and write at the proper BPI. More detailed information on the EDR tape content may be found in Ref.1, Appendix B, Section 3.

The EDR tape will usually have 2 or more label stickers on the tape face. One sticker, the IPC label, will contain the tape serial number. The other sticker, the JPL label, will have several blocks of information. Of interest to the data technician will be the blocks labelled TAPE NO., START and STOP.

TAPE NO. is in two halves, consisting of 6 letters and the tape serial number. In the first half, the first two letters indicate the space craft the data is from. MA for voyager-1 and MB for voyager-2. The third and forth letters indicate the type of data contained on the tape. RE indicates current data from the voyager instrumentation and PE indicates play back data from the on board tape system. RQ and PQ are the Quick Look options for the above data types. These are essentially the save data types as above. The last two letters of the six indicate the experiment, Cosmic Ray. The START and STOP blocks contain the julienne dates for the time range the data was gathered. This data will help the data technician to sort the tapes in tape staging, the next topic.

## Tape Staging

The staging of the EDR tape begins by receiving a box of tapes from JPL. The box will usually contain several EDR tapes and an envelope. The envelope will contain a Voyager Imaging Library Shipping Request form and a printout for each tape. After verifying the presence of the tapes listed on the form, the form should be signed and dated in the appropriate blocks, located in the lower right corner. The form should be mailed out according to the instructions listed on the back of the form.

The tapes should be examined for any physical damage. If the tape is damaged, it may require replacement. See the section on ordering replacement EDR tapes. The tapes should be divided into groups by data types. The information for this sorting is on the JPL label, in the TAPE NO block. See the section, Experiment Data Record Tape for interpretation. Playback, (PE), quick look, (QE) and regular, (RE), should always be processed separately.

Once the tapes have been sorted in this fashion, the tapes in each group must now be sorted in ascending chronological order, (oldest to most recent time), using the time in the START block of the JPL label. If two or more tapes have the same start time, then the time listed in the STOP block should be used as a second sorting index.

When the sorting is done the data technician can affix a NASA Goddard Space Flight Center tape label to the face of the tapes. The tape serial number should be printed on the new label in a clear and legible manner, along with the date received.

## Assign EDR tapes

### EXECUTION:

```
ex `sb#vg.lib.clist(edrlog)'
```

#### The program will:

- request backup permission for the log.
- display relevant input information and examples.
- prompt for tape label.
- prompt for date tape was received.
- provide the TLS slot number assigned to the tape.

To terminate input, enter a period on a blank line.

### EFFECTS:

EDRLOG will assign Tape Library System slot numbers to the volume serial number provided by the data technician. The program will create a new EDR block entry in the voyager log with the appropriate data.

This command is used to assign EDR tapes that have been staged, see Tape Staging, to the Tape Library System and the voyager log. The tape label that is prompted for is the 12 character TAPE NO on the JPL label, (see the section EDR Tape). This tape number should be typed in as it appears on the JPL label. After the data technician types in the date the EDR tape was received, the program will list the Tape Library System slot number the tape was assigned to. The slot number should be written on the GSFC label by the data technician. The proper slot number label should be affixed to the tape sleeve.

Each voyager space craft has an allotted range of slot numbers for the EDR tapes. This range can be found in the EDR CONTROL BLOCK shown in the selected space craft log listing. See the section on listing the Voyager catalog. The slot range is from the number in the 1ST SLOT column to the number in the LAST SLOT column. The program will produce a printout of tape volume serial numbers and the corresponding Tape Library System slot numbers assigned.

### The EDR block

This section of the voyager log is printed after the EDR CONTROL section in a log listing. Each entry is created by EDRLOG and will contain all information about the EDR tapes the data technician has input. Of concern to the data technician at this time is the information in the following columns:

#### col

3 JPL SER has the 6 character serial number of the tape  
plus the 2 character data type for the EDR tapes.

4 SLOT STAT has the status of the EDR tapes.  
A0 indicates tape may be removed.

B0 indicates tape has been removed.  
80 indicates the tape is awaiting processing.

6 SLOT NO has the Tape Library System slot number assigned to the volume serial number.  
11 LAST DISP has the disposition of the data on the tape.  
E1 indicates data has been transferred to a library tape.  
00 indicates the data has been killed. See DIRFIX.  
80 indicates the data is awaiting processing.

#### Notes about EDRLOG

Problems may occur during an attempt to assign EDR tapes to the voyager log. When a problem occurs, the program may terminate or ABEND, (abnormal end). The first step in resolving the problem is to undo what EDRLOG has done. The data technician should produce a log listing for the space craft via the catalog listing CLIST. The data technician can partially or completely undo the work, depending on what went wrong.

The data technician may restore the data set 'sb#vg.logbk.data', thus undoing all the work done during the EDRLOG session. This is assuming the data technician did a back up of the data set before the EDRLOG session. If this option is chosen, the data technician must remove all the serial numbers of the EDR tapes from the Tape Library System via the command TLSUPDTE. See appendix A for more information on this command.

The data technician may choose to use the command DIRFIX, (see DIRFIX), to kill the block for a single EDR tape. To kill the block properly, the 3rd column requires B0 and the 11th column will require 00. After the data technician has put these characters in the log, the volume serial numbers will require removal from the Tape Library System via the command TLSUPDTE.

Once every thing is set back to the proper conditions, the data technician will have to determine the cause of the problem. Possible causes are:

the serial number the data technician is trying to assign already exists in the log with a SLOT STAT of 80 or A0. The solution is to take the action indicated by the status.

the serial number the data technician is trying to assign is already in the Tape Library System. Remove the tape from the Tape Library System, if it is in the EDR slot range, via TLSUPDTE. If some one else is using the same tape serial number as the EDR tape is using, contact TAG.

the data technician entered the tape number incorrectly. Try again with more care in your typing.

## Remove EDR

### EXECUTION:

ex 'sb#vg.lib.clist(RMVEDR)'

The program will:

- request backup permission.
- prompt for the space craft ID.
- prompt for the 6 character volume serial number.
- prompt for the next space craft ID after termination of input.

To terminate the input, enter the character pair /\*

### EFFECTS:

RMVEDR will remove processed EDR tapes from the Tape Library System. Collum 4, (SLOT STAT), in the EDR bloc section of the voyager listing, for the indicated tape, will be changed to B0

Once the old EDR tapes have been physically removed from the tape library, they should be sent to rehab, see REHAB PROCESS in the appendix.

This command is used to remove the EDR tapes that have been processed, making room for the new EDR tapes in the Tape Library System. The EDRSAVE program marks the tapes for removal. The EDR tapes to be removed may be found by looking in the EDR section of a recent Voyager log. EDR tapes are marked for removal with an A0 in the fourth column, (SLOT STAT). Another method of locating the EDR tapes to be removed is to use LOGLIST. The serial number for the old EDR tapes are obtained from menu option 01, (show EDR), of LOGLIST. RMVEDR is a prompt driven program and is easily used. A print out of the removed EDR tapes will be produced at the end of the session.

## List EDR

### Execution:

submit 'sb#vg.lib.cntl(edrlist)'

### The program will:

provide a listing of files for a library tape or EDR tape  
with an optional hexadecimal listing.

### References:

The JCL code in the data set member,  
SB#VG.LIB.CNTL(EDRLIST).  
Ref. 1.

EDRLIST is a routine set up to generate a printout of the contents of a library tape or EDR tape. This listing will contain a hex dump and scan of the tape for the number of files specified by the user. The hex dump and scan are options chosen by the user.

To use the routine, the user must first edit the data set member, EDRLIST, indicated above. Line 35 should be edited to show the selected space craft number, the tape type, (EDR for an EDR tape or LIB for a library tape), and the JPL number of the EDR tape, (starting with either PE, QE or RE depending on the data type).

The JPL number is optional when listing a library tape. Line 38 will have listed 6 options, separated by blanks.

The tape serial number,  
the file number, (the EDR has a file number of 001),  
the number of records to skip, (for EDR tapes this is  
00000),  
the number of records to be listed,  
a flag for the hex dump  
and the output type.

## EDRSAVE

### Format:

ex 'sb#vg.lib.clist(edrsave)' 'id crs## class(c)'

### Where:

id = 1 for Voyager-1 and 2 for Voyager-2.  
## = blank for edited tapes.  
      31 for Voyager-1.  
      32 for Voyager-2.  
c = run class.

### Effects:

If the run is successful, the EDR BLOCK and LIBRARY BLOCK of the log list for the given space craft will be altered. In the EDR BLOCK;

SLOT STAT (column 4) will be changed to A0.

@ LIB ( column 7) will have the library block number assigned to the data.

NO REC and NO ERR ( columns 8 and 9) will have entries made.

LAST DISP (column 11) will be changed to E1.

ENTRY PROCESS (column 12) will have the date the tape was processed.

The LIBRARY BLOCK will have a new entry made at the location listed in @ LIB of the EDR BLOCK.

A printout is produced for analysis before moving to the next step.

### References:

Ref. 1. Pg. 43 and 49.

Ref. 5.

This program is the first step in the production process for the Voyager space craft. EDRSAVE compresses and copies the data from the EDR tape sent by JPL to a file on a library tape cartridge. A printout of warning messages and a listing of event times are produced for analysis before proceeding with production work.

### PRINTOUT:

The printout from the EDRSAVE routine ends with SVE after your user id. The warnings section of the printout will usually contain missing minor frames information. This section isn't to helpful to the data technician, but it should be scanned for any thing unusual. The listing of event times follows the warnings listing and will be most helpful in determining if the data received is good. The data technician will be looking for discrepancies between, the differences of the SCET HR and START ERT HR columns in the listing, and the mean One Way Light Time, (OWLT), for the space craft. The OWLT is the time the signal from the space craft takes to reach the earth. Each EDR tape processed by EDRSAVE will have a separate event time listing.

The event time listing starts with the volume serial number of the EDR, the library tape volume serial number and the library file number. This will be followed by a series of columns and sub columns, (12 columns and 12 sub columns).

TYPE lists the data type for the row. The data is labelled SDR and the other labels indicate space craft status.

MOD 2\*\*16, MOD 60, and LINE CNT are the segment counters of the space craft that control the experiment runs.

SCET is the space craft event time, the time when the data is broadcast from the space craft. It is broken down into hours, seconds, milliseconds, and the year.

START ERT is the start of the earth receive time for the space craft. This is to say, the time receiving stations on earth started receiving the information from the space craft. This column is also broken down into hours, seconds, milliseconds, and year.

STOP ERT is the stop earth receive time, the end of the broadcast for this segment of data. It is broken down into sub columns of hour, second, millisecond, and year.

DATA MODE is the space craft method of identifying the data.

REC ID and S/C ID are the logical record number and space craft number.

PHYS REC is the actual record number of the data.

TAPE-FILE the logical EDR tape file number, always 0 because an EDR tape has only one file.

For a PE tape, the number in the MOD 2XX16 column should increment. If the number suddenly drops, the data at this physical record may be bad. The year appearing in the SCET YR column should be the same for each record. If another year appears in the column, the data at this physical record may have been corrupted. If the year appearing in the SCET YR column is the current year, then the difference between the hours listed in the columns START ERT HR and SCET HR should be greater than the OWLT. If the hourly difference isn't greater than the OWLT, then the tape may contain mixed RE and PE data.

For a RE tape, much of what was stated for the PE tape is true. The number in the MOD 2XX16 column should always increment. The year appearing in the SCET YR column should always be the current year, with the possible exception of data gathered around new year day. The difference between the hours listed in the START ERT HR and SCET HR columns should be between the OWLT and OWLT plus one.

If the conditions listed above indicate corrupted data, the associated physical records should be noted in the appropriate data set member. See EDR1600. This data should be edited out of the



file. If the conditions listed above indicate a mixture of RE and PE data, the data technician should try to capture the data. First omit all physical records that appear to be PE data from the file and edit to a new tape. The data technician may now capture the PE data by omitting all physical records containing RE data from the file and editing to a new tape. See EDR 1600.

If editing is required, the data technician must cross reference the EDRSAVE printout to the appropriate Voyager log to kill the library entry for the EDR tape. To do this, look at the start of the event time listing for the physical files to be edited. Noting the EDR volume serial number, the data technician may locate the serial number in the EDR BLOCKS under the column JPL SER. Cross to the @ LIB column and note the library block number. This is the library block to kill, see DIRFIX. The data technician can also use the last three digits in the LIB TAPE and the FILE number portion in the start of the event time listing. Noting these numbers, look in the bottom of the LIBRARY BLOCK of the log. The LIB TAPE number is listed in the SER column and the FILE number is listed in the SEQ column of the log. When these pair of numbers are located in the log, cross over to the BLOCK column of the log and this is the library block number to kill. See DIRFIX for information on killing a log entry. See RUNEDIT and EDR1600 for further information.

Once editing is done, the new EDR tape must be processed like any EDR tape. The EDRSAVE step will require blanks after the CRS argument.

NOTE: If the EDR tape is not readable due to I/O errors, a regenerated tape may be ordered from Mr. Neil Toy at 8-604-792-1021. Other problems or inquiries in regards to the JPL production of EDR tapes should also be submitted to Mr. Toy.

## RUNEDIT

SB#VG.LIB.CNTL(RUNEDIT) may be submitted to scan a library tape file or an EDR tape. RUNEDIT will produce a printout and a data set member in the data set SB#VG.LIB.DATA. See also EDR1600.

The printout will contain a listing of the physical records for the file or tape specified. RUNEDIT will mark each physical record that does not have a line count or space craft event time that is within given tolerances. These lines are marked with a double asterisk, \*\*.

The SB#VG.LIB.DATA(member) will contain the marked physical record numbers and to other variables. This data set member is used by EDR1600 to create an edited EDR tape.

RUNEDIT is used before or after a tape is run through EDRSAVE. The physical records placed in SB#VG.LIB.DATA(member) would either be altered or rejected by ENCGEN. EDR1600 may be used to remove these records and trap play back data.

To use RUNEDIT, the data technician will need to edit the bottom eleven cards in the JCL. The first card is the execute statement. The ID and SOURCE parameters must be set to indicate which voyager space craft number. SOURCE is referring to the LIB or EDR tape.

The next card designates the original EDR tape label. The JPLNO will normally start with RE or RQ. RUNEDIT may not be used with a play back tape or file.

The third and forth card of the eleven are used for a data set that is already allocated and cataloged. The forth card will specify the SB#VG.LIB.DATA(member) that RUNEDIT stores the bad physical record numbers in. The fifth and sixth cards serve the same purpose and three and four, except the data set is not allocated and cataloged at the time.

The ninth card should be edited next. The first two entries on this card are the tape label and file number. All other entries should not be changed. If an EDR tape is to be scanned, the file number should be 01. If a library tape cartridge is to be scanned, the proper tape volume should be used. The file must be the file number produced from the EDR tape listed on the second of the eleven cards.

The tenth card designates the tolerances used by RUNEDIT. The first number on this card designates the number of milli seconds variance between the one way light time and the difference of the space craft event time and the earth receive time.

### Examples.

Voyager 1. Scan of the EDR tape 02823D for receive times varying by more than half a second and two hundred line counts.

02823D is a normal data tape. A new data set will be used for the output or RUNEDIT.

```
// EXEC EDITSCAN, ID=1, SOURCE=EDR,
//          JPLNO=REO2823D,
// *          PICK=DISK1,
// *          DSNOUT1='SB#VG.LIB.DATA(ED43F02) '
//          PICK=DISK,
//          DSNOUT='SB#VG.TEMP.DATA '
// *456789012345678901234567890
//DATA5 DD *
02823D 01 00000 99999 00000 00080 00000 F T
      500.X 200.
// EXEC NOTIFYTS
```

Voyager 2. Scan of a library tape M2L068, file 45. File 45 was produced from a normal data EDR tape. Receive time may vary by one second and the line count may vary by 50. An existing data set is used to store the physical records.

```
// EXEC EDITSCAN, ID=2, SOURCE=LIB,
//          JPLNO=REO2823D,
//          PICK=DISK1,
//          DSNOUT1='SB#VG.LIB.DATA(ED68F45) '
// *          PICK=DISK,
// *          DSNOUT='SB#VG.TEMP.DATA '
// *456789012345678901234567890
//DATA5 DD *
M2L068 45 00000 99999 00000 00080 00000 F T
      1000.X 50.
// EXEC NOTIFYTS
```

## EDR1600

Submit 'SB#VG.LIB.CNTL(EDR1600)'

Often a tape comes in that will require editing of data. EDR1600 is used in conjunction with a member found in SB#VG.LIB.DATA. EDR1600 must be edited to show the following data:

- V the space craft ID.
- IE the tape volume number of the EDR tape.
- LT the last 3 digits of the library tape produced by the  
EDRSAVE run for the EDR tape to be edited.
- LF the library file number of the above library tape.
- OE the volume number of the output tape.
- MEM the member name in SB#VG.LIB.DATA.
- TYPE the data type of the EDR tape.

This information is entered in the member EDR1600. The line looks like this:

```
// EXEC EDIT,V=#,MEM=#####,LT=###,LF=##,OE=#####,TYPE=##,  
// IE=#####
```

The MEM referred to above is created by RUNEDIT. OE is a tape assigned via EDRLOG by the data technician to use as the new EDR tape. This tape should be SL labelled and processed by EDRSAVE as an edited tape.

## RMVWRK

SB#VG.LIB.CLIST(RMVWRK) is used to remove tape volume names from the Tape Library System and Voyager log. The tapes removed are those Work tapes in the log marked for removal. The process is automatic, based on a number supplied by the data technician.

When executed, RMVWRK will give the data technician a chance to back up the log. After the log back up, the data technician is prompted for the satellite number, then the number of tapes to remove. The number of tapes to be removed should not be greater than ten. After the specified number of tapes are removed, RMVWRK will allow another chance to remove more tapes. If the data technician chooses to remove more Work tapes, the process is repeated. If the data technician chooses not to remove more Work tapes, RMVWRK generates a printout and then terminates.

## ASSIGN

SB#VG.LIB.CLIST(ASSIGN) will place CIT or Work tape volume labels in the Tape Library System. ASSIGN will also set the last available serial number field in the appropriate control block. Tape volume serial numbers are automatically assigned.

When executed, ASSIGN will give the data technician a chance to back up the Voyager log. After the log back up is done, ASSIGN will prompt the data technician for the satellite identification number. The next prompt is for the tape type, either CIT or Work. After the tape type is chosen, ASSIGN prompts for the number of tapes to assign to the Tape Library System and Voyager log. This number must be no greater than five.

When the range of tapes have been assigned, the data technician is given the chance to assign more tapes. If the data technician chooses to assign more tapes, the process is repeated. If the data technician chooses not to assign more tapes, a print out is generated and ASSIGN terminates.

NOTE: Space must be made in the Tape Library System by first removing old tape volume numbers via the appropriate remove utility, either RMVCIT or RMVWRK.

Currently, CIT tapes are placed in the Tape Library System manually via TLSUPDTE.

## ENCGEN

### SB#VG.LIB.CLIST

ENCGEN breaks the library file produced by EDRSAVE into 15 minute volumes to be merged into the encyclopedia data base. ENCGEN will also make corrections to the FDS counts or SCET time. It will replace these items with FDS counts or SCET times according to tolerance criteria coded into the ENCGEN program. The resulting file is saved onto a work tape cartridge to be merged into the encyclopedia data base.

Encgen works on the library and work control blocks of the Voyager logs. The program scans the PROCESSING NO and DISP columns, (columns 10 and 11), of the library block for a number less than 4, (in column 10), and an 80, (in column 11). After processing the files indicated in the library control block, the DISP column is changed to E0, if processing is successful, and the work block number of the work tape is entered into the WORK column, (column 14). A new work block entry is made to indicate the work tape the files reside on. If the process was not successful, column 10 will be incremented by 1. ENCGEN will give up after four tries at processing.

The printout from the program should be scanned for abnormal errors, such as large numbers of GETTIM and TIMCHK statements in the first column, or other error conditions. The printout will indicate the library tape and file number that has been processed, as well as the disposition of the processing.

NOTE: This program may require more than one run to process all available library files. It is a time dependent program and will stop at files with times out of sequence. This is why it is important to enter the EDR tapes in time ordered fashion as stated in the section on Tape Staging.

The program requires an argument list to process the correct files. `V FILES(#) CLASS(L)' where;

V = 1 for Voyager 1 and 2 for Voyager 2.

# = no. of anticipated files, with 1 the default. Optional.

L = run class, with A the default. Optional.

#### EXAMPLE

ex `SB#VG.LIB.CLIST(ENCGEN)' `1 FILES(3) CLASS(F)'

The program will attempt to process 3 library files from Voyager 1 over the week end.

ex `SB#VG.LIB.CLIST(ENCGEN)' `2'

The program will attempt to process 1 library file from Voyager 2 during the work day.

Remove Encyclopedia  
RMVENC

This program removes volume labels from the Voyager log and the Tape Library System that have been marked for removal by the member ENCMRG. It is a prompt driven program that will request the satellite number and then the number of tape cartridges to remove from the log list. When the tape cartridges are removed from the log, they are also removed from the Tape Library System. RMVENC provides a printout of the volume serial numbers removed.

To execute the routine, type at the command line:

```
ex 'sb#vg.lib.clist(RMVENC)'
```



Assign Encyclopedia  
ASNENC  
SB#VG.LIB.CLIST

Asnenc is used to assign new encyclopedia tape cartridge volume labels to the voyager log and the Tape Library System for future use. Old tape cartridges are reused with new volume labels.

The program is prompt driven and usually requires RMVENC to be completed successfully before running. ASNENC will first request permission to back up the Voyager data base. After disposition of the permission, the program will request the Voyager satellite number and then the number of tape cartridges to assign. The program will provide a printout of the new volume serial number, Tape Library System number, and old serial number.

Asnenc also provides a data set, 'SB#VG.LABEL.CNTL', to use as the JCL for the label job. This data set will require editing. Old Execute statements should be deleted and the Exec Notifys statement should be moved to the bottom of the JCL.

After assigning the tapes, the data technician should go to the tape library and physically change the old volume serial numbers, on the designated tape cartridges, to the new volume serial numbers. The data technician should also insure the cartridges are wright enabled, (no white dot appearing). After this the label job may be submitted.

The program will alter the encyclopedia control block for the chosen Voyager log. The last volume serial number will be increased in the sixth column titled LST SER.

To execute the routine, type at the command line:

```
ex 'sb#vg.lib.clist(rmvenc)'
```

## Encyclopedia Merge ENCMRG

ENCMRG will insert a file located on a work tape into the existing encyclopedia. The exact placement of the file depends on the volume range of the data. A new encyclopedia tape cartridge will be used and the old cartridge will be marked for removal.

This program affects the work and encyclopedia blocks of the Voyager logs. It will search the MRG DSP entry, (column 13), of the work block for an 80. The work file will then be merged into the data encyclopedia according to the time period covered by the files. The entry for MRG DSP will then be changed to E0 if the merge of the indicated file is successful. A new encyclopedia block will be created with the pertinent data entered into the appropriate column. The old encyclopedia block is not listed in subsequent logs. If the work is not successful, no change will take place.

A printout will be produced showing the work blocks merged and pertinent data for the processing of the information.

The program requires arguments for execution in an argument list:

`V Class(L)' where

V = 1 for Voyager-1 and 2 for Voyager-2.

L = run level with class A the default. Optional.

### EXAMPLE

ex `sb#vg.lib.clist(ENCMRG)' `1 class(e)'

This will assign the merging of work tapes for Voyager 1 to overnight processing.

ex `sb#vg.lib.clist(ENCMRG)' `2'

This will assign the merging of work tapes for Voyager 2 to process during the work day, the default selection.

## RMVCIT

SB#VG.LIB.CLIST(RMVCIT) is used to remove tape volume names from the Tape Library System and Voyager log. The tapes removed are those CIT tapes in the log marked for removal. The process is automatic, based on a number supplied by the data technician.

When executed, RMVCIT will give the data technician a chance to back up the log. After the log back up, the data technician is prompted for the satellite number, then the number of tapes to remove. The number of tapes to be removed should not be greater than ten. After the specified number of tapes are removed, RMVCIT will allow another chance to remove more tapes. If the data technician chooses to remove more CIT tapes, the process is repeated. If the data technician chooses not to remove more CIT tapes, RMVCIT generates a printout and then terminates.

Encyclopedia for the California Institute of Technology  
ENCIT

EXECUTION:

ex 'sb#vg.lib.clist(ENCIT)' 'V vol(####) class(A)'

where

V = 1 for Voyager-1 and 2 for Voyager-2. Required.  
#### = the number of volumes to copy, the default is 01200.  
A = N for immediate execution.  
A for routine execution.  
E for over night execution.  
F for week end execution.

EFFECTS:

Creates a block entry in the CIT block of the space craft log.  
Produces a shipping printout.

For further information see references 1 and 5.

ENCIT will copy a specified number of encyclopedia volumes to a reel of tape. If the copy job is successful, two copies of a shipping report will be printed. The report will show the tape number, the start and stop volume numbers, the creation date and the type of data. The report will have space to indicate who sent the tape and who received the tape. One copy of the report should be sent with the tape and one copy of the report should be kept on file.

Before ENCIT is used, the data technician should be sure a tape is available in the Tape Library System for the space craft. To do this, the data technician may use TLSUPDTE or TLSREP as described in the Tape Library System section of this book. If a tape is not present in the Tape Library System, the data technician must stage and assign a tape using TLSUPDTE. The tape serial number, appearing on the NASA/GSFC sticker, will have the format MvC###.

v is the Voyager number and ### is the tape volume number as determined in the log. The volume number will be the number found in column 10, LST SER, of the CITENCY CONTROL section PLUS 1. For Voyager-1, if the LST SER number is 034, then the new volume number will look like this: M1C035.

After successful completion of ENCIT, the tape should be removed from the Tape Library System via TLSUPDTE, boxed and shipped using an INVOICE/SHIPPING DOCUMENT. The data technician may have the document typed by the group secretary, Ms. Hilley, Ex. 6-9244. All CIT tapes should be shipped to:

Tom Garrard  
Downs Lab., Bldg. 220, Rm.47  
Caltech  
Pasadena, Ca. 91125

The INVOICE/SHIPPING DOCUMENT must have two authorized signatures. Instructions are listed on the back of the form. When ready to ship, the forms and the box of tapes may be taken to building 16, the shipping bay, for shipping. If the data technician prefers, GSFC transportation may be called to pick the box of tapes up. GSFC transportation is also located in building 16 at extension 66261. Copy 10 of the INVOICE/SHIPPING DOCUMENT is kept on file.

## CIT REMAKE

SB#VG.LIB.CNTL(CITRMAKE)

CITRMAKE will regenerate a CIT encyclopedia tape. The data technician will need the time period for the desired volume range of the data. A properly labelled tape, assigned and hung in the Tape Library System, will also be required. If the desired time period is not known, the data technician should use VOLDATE to obtain the dates and times.

To submit CITRMAKE, the data technician must first edit the JCL. On the // EXEC SELECT line, before the // INPUT DD \* statement, the proper Voyager number should be set in the ID= part. The tape volume number will be set in the STAPE= part.

After the // INPUT DD \* statement, the start date, start time, end date and end time should be typed as follows:  
YY/MM/DD HH:MM:SS YY/MM/DD HH:MM:SS

Submitting the JCL should result in an exact copy of a CIT tapes produced by the ENCIT program. When the tape is made, the data technician should remove the tape volume number from the Tape Library System and ship the tape in the usual way.

## LSELECT

Lselect lists, hex-dumps, and/or copies voyager encyclopedia cartridges for a given volume range. See ~~SB#VG.LIB.TEXT(LSELECT)~~ for more in depth information. *SB#IC.USERGUIDE.TEXT*

To run lselect, edit the data set member SB#VG.LIB.CNTL(LSELECT). Line 160 sets the tape serial number and space craft id. Line 190 will be edited to contain the first and last volume numbers on the tape to be processed. If the volume numbers are not known, the clist TIMVOL may be used to convert dates to volume numbers. A request mask is used to tell what action to take. The technician can print or copy to another tape.

If a tape copy is to be made, the labelled tape should be present in the Tape Library System. The VOL=SER= variable on line 110 should be set to the tape serial number.

## VOLDATE

SB#VG.LIB.CLIST(VOLDATE) will prompt for an eight digit volume number. A date and time, to the nearest fifteen minutes, will be returned. The volume dates start at January 1, 1977.



## TIMVOL

SB#VG.LIB.CLIST(TIMVOL) will prompt for a date and time. the format for the input is YY/MM/DD HH:MM:SS.SS. TIMVOL will return a volume number for the nearest fifteen minute interval. The start date TIMVOL uses for the calculations is January 1, 1977.

## Time Correction Cards JPL

Cards and a listing are received from JPL annually. Each Voyager space craft will have a set of cards and a listing. The cards and listings have the data used by the clist member JPL to update the tables contained in the data sets SB#VG.SC31.CNTL and SB#VG.SC32.CNTL.

The listing produced with the cards should be checked first. Often, more cards appear at the end of the listing than have been sent with the listing. Usually, the best policy is to update from the listings.

Each card will have a series of fields. The data should be copied exactly as appears when JPL prompts for the data. The next to last field will have the letter A or B. A is for Voyager-1 and B is for Voyager-2. Do not mix the data for the two space craft in the same data set. The last field is the card number. To determine what card number to start from, the SC31 and SC32 data sets mentioned above should be consulted. Browse the bottoms of these data sets for the most current entry.

A typical card looks approximately like the following:

```
MJS SCET 1417860 1286426242.530 47.999924 16484.743 B 71500
```

This card is for Voyager-2. It is card number 7150. The data set member JPL is executed as follows:

```
EX 'SB#VG.LIB.CLIST(JPL)' 'ID(#)'
```

The # will be 1 for Voyager-1 or 2 for Voyager-2. The program will prompt for the fields appearing after MJS SCET. To terminate input, the end of file characters should be used on a new line, like this:

```
/*
```

The program will then list the last part of the appropriate table using the QED editor. The first field will appear different compared to the numbers input to the program. The number shown is calculated by JPL and should always be increasing. The card numbers should be in numerical order and all the letters indicating the space craft should be the same.

If the listing is correct, end the program with SVE to save the new changes. If the listing is incorrect, then the SC table in use will require editing.

## Data bases for Voyager

The Voyager Cosmic Ray Experiment employs many data bases and support data sets. The following is a listing and brief description of these data sets and data bases.

The library data base. Each Voyager space craft has one library data base. The data base is composed of files of compressed EDR data. The data in these files are considered to be raw data. These files are stored on tape cartridges in the tape library and are accessible at all times. The files and tapes are tracked in the LIBRARY BLOCK sections of the voyager logs.

The encyclopedia data base. Each Voyager space craft has an encyclopedia data base. The data base is kept on ency tape cartridges in the tape library and are available at all time. Each tape cartridge has one file of processed data saved as volumes. This data is the data the research scientists use. The tapes and data are tracked in the ENCYCLOPEDIA BLOCK sections of the voyager logs.

The voyager catalog. The catalog is composed of two Voyager logs. The logs contain tracking information of the data and tapes associated with the voyager cosmic ray experiments. These logs are the key used by production and analysis software to access the various data based described above.

The tape library system. TLS is the system data base that tracks tape slot allocation. TLS contains information about the various tapes assigned to the tape library. Access to TLS is via TLSUPDTE or TLSREP. TLS is also accessed by the production and analysis software to perform tape related functions.

The trajectory data base. Each of the Voyager space craft have an associated trajectory data base. The data bases are kept on tapes in the tape library. These tapes are accessible at all times. The relevant trajectory data between the Sun, Earth and space craft are in the files of these tapes. Three relevant data sets exist for trajectory information.

'SB#VG.TRAJ.CNTL' is a partitioned data set containing members of JCL and lists relevant to data extraction and data placement on the tapes of the data base.

'SB#VG.V1RTRJ.DATA' and 'SB#VG.V2RTRJ.DATA' contain heliocentric trajectory data for the life time of Voyager-1 and Voyager-2.

'SB#VG.TENTH.V1RTRJ.DATA' and 'SB#VG.TENTH.V2RTRJ.DATA' are heliocentric trajectory data listed for every tenth day for the space craft life time.

The one way light time data sets. Each space craft has a data set containing information on the one way light time for the space craft. These tables are used by the production system to help with quality control of the data introduced into the

encyclopedia data bases.

The SCE tables. Each space craft has an SCE time table that relates the space craft event time to the one way light time for the space craft. These data sets are used by production software for quality control of the data to be introduced into the encyclopedia data bases.

## Data Base Maintenance

The data set 'SB#VG.LOG.DATA' is a data base containing relevant information about tapes, tape cartridges, and production status of the data sent by the Voyager space crafts. This data base is routinely altered to add or remove a tape or tape cartridge from the data base and the Tape Library System. Occasionally the data base must be altered to correct errors that have occurred or to add resources. It is always important to remember to back the data set up before altering the data base to correct an error. This helps to recover from any induced errors.

Before starting a production run, it is usually a good idea to check to see if the resources required are present. The resources in this case are Tape Library System slots for incoming EDR tapes and labelled, blank tapes and tape cartridges for production steps that create tape files. These tapes and tape cartridges are, of course, not the only resources required, but they are what we will be dealing with here.

Clist routines are provided to add and remove tapes and tape cartridges in the data base. They usually work in pairs to remove and allocate tapes and tape cartridges for production use. These routines are listed here and discussed elsewhere.

RMVEDR is used to remove the EDR tapes that have been marked for removal by EDRSAVE, from the Tape Library System and to mark the tape as removed in the data base.

EDRLOG is used to enter an EDR block into the data base and to allocate a Tape Library System slot for the EDR tape.

RMVWRK is used to delete a range of work cartridges from the Tape Library System.

RMVCIT is used to mark CIT tapes as removed from the data base and delete the tape from the Tape Library System.

ASSIGN is used to increment the LST SER column of the WORK and CIT control blocks to make new tapes and tape cartridges available for use in production. ASSIGN also will allocate a Tape Library System slot to the tapes or tape cartridges.

RMVENC is used to delete a range of encyclopedia tape cartridges from the Tape Library System.

ASNENC is used to increment the LST SER column of the ENCYCLOPEDIA control block to make new tape cartridges available for use in production work and to allocate a Tape Library System slot to the tape cartridges.

When errors occur, for any reason, the data base may require modification or regeneration. When work outside of production is to be done to correct errors, it is important to BACK UP the data set 'SB#VG.LOG.DATA' to the data set 'SB#VG.LOGBK.DATA' before starting the process or correction. When the process is done, it is also important to issue the FREEALL command to release the data

set for further work. Several clist routines are provided to correct problems.

The most catastrophic method of error correction is to recover the data set from a data set that was backed up before the error occurred. See the section on backups. Once the recovery has been done, the data technician must re-accomplish all the work done up to the present, less the error. The data technician must also check to see if all the tapes and tape cartridges that will be required for the work are present in the Tape Library System before attempting to re-accomplish the work.

DIRFIX is used to change information in a specific block of the data base. DIRFIX should be used in conjunction with a current copy of a space craft log to locate the correct block, and ref 2 to locate the correct place in the block to change. DIRFIX is not as catastrophic as recovering an older data set, but it is easier to induce an error into the data base. Care should always be used when altering information in the existing data base.

ALTBLK and REDOLIB are clists supplied that will change the process disposition of blocks in the log. REDOLIB is primarily for use with library blocks. These methods are the least catastrophic and are the recommended procedures to use, if possible.

NWENCY is used to alter the tape cartridge serial number listed in an encyclopedia block. This is done when one of the Voyager logs indicate that the last available encyclopedia tape cartridge serial number has been used.

## New Encyclopedia

ex 'SB#VG.LIB.CLIST(nwency)'

NWENCY is used to compress the encyclopedia tape cartridge serial numbers belonging to the encyclopedia data base. When serial number 999 has been used, the current serial numbers that have become permanent should be made contiguous in the Tape Library System. This is done by making one for one copies of the encyclopedia tape cartridges, with the oldest serial number becoming 001, the second oldest serial number becoming 002, etc... This process of compression will free tape cartridge serial numbers to be used by the production system.

When NWENCY is executed, it will prompt for the space craft number, the old encyclopedia tape cartridge serial number and the new encyclopedia serial number. After the information is obtained by NWENCY, the encyclopedia blocks in the log for the given space craft is scanned for the old encyclopedia tape cartridge serial number. The old encyclopedia tape cartridge serial number is replaced with the new encyclopedia tape cartridge serial number, when found.

The process of encyclopedia tape cartridge serial number compression involves the following steps.

Step One. Back up all current production work for both space craft and the Voyager catalog.

Step Two. Using RMVENC remove all used encyclopedia tape cartridges from the Tape Library System.

Step Three. Using a current log for the space craft, count how many encyclopedia tape cartridges are in use. Place labels on blank tape cartridges starting with the serial number 001 to the total number of tape cartridges in use. Using TLSUPDTE, assign these new tape cartridges to the Tape Library System and hang them. Submit label jobs for each of the new encyclopedia tape cartridges.

Step Four. Copy each old encyclopedia tape cartridge serial number to the proper new encyclopedia tape cartridge serial number. This can be done via the same procedure used to back up the encyclopedia tape cartridges, with some temporary changes to the back up CLISTs. Verify all copy jobs.

Step Five. Remove all the old encyclopedia tape cartridge serial numbers from the Tape Library System. Assign the new encyclopedia tape cartridge serial numbers, one for one, to the old encyclopedia tape cartridge serial number tape slots in the Tape Library System. Verify that the proper serial numbers are in the proper tape slots.

Step Six. Modify the proper encyclopedia control block using DIRFIX. Set the starting serial number to 001 and the last serial number to the current last new encyclopedia tape cartridge serial number. Set the last used serial number to the current last new encyclopedia tape cartridge serial number.

When the data technician is sure all the work has been accomplished properly, the old encyclopedia tape cartridges should be stored in building 2, room W20. The data technician may wish to submit a 26 day average flux job for the life time of the space craft. This will verify that the log and tape cartridges can be accessed with no trouble by the software. The data technician should now assign encyclopedia carts as described in the section on ASNENC.



Fixing the Directory  
DIRFIX  
SB#VG.LIB.CLIST

This program will allow the reading or modification of a block of data found in the 'VOYAGER LOG' control sections. Using a log listing the program can be set to edit starting at a block number. This block number is referred to as a RECORD. The program will display the contents of the record for a specified number of words, usually 16. The display consists of a hexadecimal dump with each word 8 bytes long, an EBCDIC listing, and 2 decimal interpretations of the word. For further information on DIRFIX or block contents, see references 2 and 4.

The program is prompt driven and requests a positional parameter designator. This is the file 'SB#VG.LOG.DATA' for the Voyager project. Be sure to back this data set up before using it. After displaying setup information, the program will display a command prompt consisting of a listing of command variables, separated by commas, required for processing. The prompt looks as follows;

&LOC RECORD=,WORDS=,,FUNC=0 OR 1,&END

The RECORD is the block number found in the Voyager listings.

The WORDS requires the starting word, usually 1, and the ending word, usually 16.

FUNC is set to 0 for listing and 1 for editing.

The response must start with a space and ampersand, (&), followed by LOC when using the IBM 3081 terminal. The response must end with a comma followed by an ampersand, (&), and END. An example follows;

&LOC RECORD=17571,WORDS=1,16,FUNC=1,&END

This would put you at the first word of block 17571, in the edit mode. No listing would be provided until after the end of the edit session.

The next prompt will be the edit prompt, consisting of command examples much like the command prompt.

&DATA CAT( )=,HCAT(, )=,XCAT( )=,&END

CAT means concatenate and will replace the word number, 1 to 16, in the parentheses with the decimal value after the equal sign.

HCAT is a half word concatenation requiring either the 1st or 2nd half of the word, and the word number to be replaced by the decimal number after the equal sign.

XCAT functions as CAT except it requires a hexadecimal value after the equal sign.

An example of a proper response follows, remember to start the line with a space;

```
&DATA HCAT(1,9)=0,&END
```

Once the proper response is given, or if FUNC is set to 0 in the command response, a listing is made for the requested number of words. The listing consists of 5 fields, the word number, word contents (8 bytes long), EBCDIC symbol, decimal value for the first half word, and decimal value of the second half word.

After this the command prompt is displayed again. You may go on to display a record, edit a record, or terminate the program by entering the End Of File marker. This is a character string consisting of a back slash and asterisk, ( /\* ). You are then returned to the TSO command prompt and you should issue a FREEALL to release the Voyager log.

#### QUICK REFERENCE

FUNC=0	for display.
func=1	for editing.
/*	for terminating program, end of file marker.
-32768	decimal value for hexadecimal 80 to set half word.

-20389 hex for B0.

## Alter Block

### ALTBLK

Execution,

ex 'sb#vg.lib.clist(ALTBLK)'

See Ref. 2 for more information.

ALTBLK is used to change information in the Voyager log. It is primarily used to change the processing disposition of a block. ALTBLK may be used to change any part of a block. ALTBLK should be used in conjunction with a current print out of the log and the Voyager Log Master Copy, Ref. 2.

The data technician will need to know the block number, byte number and hexadecimal value to be used. The block number is the log block to be changed that the data technician found in a log listing. The byte number is found in Ref. 2, in the listings for the block formats located at the back of the book. One should be added to the byte number for the data type desired. As an example, the library block listing indicates byte 32 to be the processing disposition. Using ALTBLK, the byte would be 33. A list of byte numbers are provided here for the convenience of the data technician. The one has already been added.

Block type	Byte	Data description
EDR BLOCK	17	slot allocation status
EDR BLOCK	37	processing disposition
LIB BLOCK	33	processing disposition
WORK BLCK	25	merge disposition
CIT BLOCK	21	slot allocation status

The hexadecimal value will be used to change the status of a slot or processing disposition. A list of these values are provided here.

- 00 - kill
- 80 - awaiting disposition
- A0 - marked for removal
- B0 - removed
- E0 - disposition complete
- E1 - disposition complete

When ALTBLK is executed, the data technician is first given the chance to back up the log data set. This is strongly recommended. Once the back up is done, the user is prompted for input. Using the IBM 3101 terminal, the input should be offset one space to the left of the guide. The following is an example of input to kill library block 15287. The first line is printed by ALTBLK as a guide for input. The second line is typed by the

data technician. Note the offset.

```
INPUT BLOCK BYTE QVAL(HEX)
      15287    33    00
```

With another terminal, the example would be right justified as follows,

```
INPUT BLOCK BYTE QVAL(HEX)
      15287    33    00
```

The ALTBLK session is terminated with the end of file characters, /\* . Care should be employed when using ALTBLK. The data technician can easily induce errors into the log. It would be a good practice to back the log up at every given opportunity.

Redo Library  
REDOLIB

Execute:

ex 'sb#vg.lib.clist(REDOLIB)'

REDOLIB resets the processing disposition of a given library block number to 80. The data required will be the library block number and the attribute of the block number, found in the thirteenth collum of a log printout.

The data technician will first be given the chance to back up the data set SB#VG.LOG.DATA. When the back up is done, a prompt for the library block number and attribute will be given by REDOLIB. The prompt will look as follows.

INPUT LIBRARY BLOCK NO. AND ATTRIBUTE BLOCK NO.(RIGHT JUST.) /\* TO  
END.  
LIBRARY   ATTRIBUTE

If the data technician is using an IBM 3101 terminal, the data must be entered with an offset of one space to the left. The attribute must be two digits long. An example follows.

INPUT LIBRARY BLOCK NO. AND ATTRIBUTE BLOCK NO.(RIGHT JUST.) /\* TO  
END.  
LIBRARY   ATTRIBUTE  
12345           67

If the data technician is using another terminal, the numbers are to be right justified. To end the session, the data technician must type in the end of file character set, /\* .

## Trajectory

### Supplementary Experiment Data Record

Trajectory tapes arriving from JPL are labelled with the precursor SEDR. These tapes are copied into a library of tapes for Voyager-1 and Voyager-2. The library resides on tape cartridges with labels V1TR##, for Voyager-1, and V2TR## for, Voyager-2. The ## is the sequence number of the tape cartridges.

The SEDR tape labels will indicate the space craft the tape belongs to and the time interval of the data. These tapes are normally stored in Building 2, room W20.

The processing of these tapes is currently performed by Ms. Peg Harrison, Code 690, Building 1, Room , Ext. 62773. Every six months, the data technician should copy the new tape cartridges produced by Ms. Harrison into the Cosmic Ray Trajectory Library. When this is done, the new tape cartridge volume serial numbers, the Code 690 tape cartridge volume serial numbers, and the time intervals of the trajectory data are to be listed in the data set members SB#VG.TRAJ.~~DATA~~(V1TRJINF) and (V2TRJINF).

<sup>CNTL</sup>  
Until information is requested, this is the end of processing. The following sections describe the JCL used to copy the Code 690 tape cartridges, extract and list data, or predict data.

## Updating Trajectory Library

Usually SEDR tapes are copied via the program VPSCOPY. The JCL used to copy tapes is found in three data set members. SB#VG.LIB.CNTL(COPYSED) is used to copy the 9 inch reels of tape into the data base. SB#VG.LIB.CNTL(COPYSEDR) is used to copy code 690 tape cartridges into the data base. SB#VG.TRAJ.CNTL(TRAJCOPY) uses the program FATAR to make copies of the code 690 tape cartridges.

Approximately every six months, the code 690 tape cartridges should be copied to the trajectory data library. Ms. Harrison should be contacted to get the proper time range and tape volume numbers for each space craft. The data set members SB#VG.TRAJ.CNTL(V1TRJINF) and (V2TRJINF) should be consulted to determine what tape cartridges are to be used in the copy job. The data technician should verify the presence of the tape cartridges in the Tape Library System. If the tape cartridges aren't available, a new tape cartridge must be prepared, hung and labelled SL.

Once the data technician has gathered all required information and resources, the data set member SB#VG.LIB.CNTL(COPYSEDR) should be edited. At the bottom of the JCL should appear lines like the following.

```
// EXEC COPYVBS,INVOL=S2088A,OUTVOL=V2TR14,ID=2
```

    invol is the code 690 tape cartridge to be copied.  
    outvol is the voyager trajectory tape cartridge to be copied to.  
    id is the voyager space craft number.

### Example:

If the next available trajectory tape cartridge for voyager-2 was V2TR15 and the code 690 tape cartridge S2089A was the next cart to copy, then the line entry should be changed to look like,

```
// EXEC COPYVBS,INVOL=S2089A,OUTVOL=V2TR15,ID=2
```

Several lines may be set up so voyager 1 and voyager 2 may be updated in the same run. When the data technician is finished, the member may be submitted for execution. The other members work in basically the same way as COPYSEDR.

## Listing Trajectory Data

Listing, or printing, the trajectory data is accomplished via several data set members. Each of the Voyager space craft has members in SB#VG.TRAJ.CNTL for extracting data from the tape library. Several members exist because the location of the data changes for different flight conditions. These locations are indicated by word numbers. Flight conditions, or flight modes, will be a cruise mode, or an encounter mode. As modes change, the word number changes.

The line the tech may have to alter is the VOL=SER=( ) in the FT12F001 statement. A list of tapes go between the parentheses, separated by commas. The FT05F001 input statement may require the FROM= and TO= dates to be changed along with the WORDS= variable.

The planetary encounters for Voyager-1 are the Jupiter and Saturn encounters. For Voyager-2, the encounters are Jupiter, Saturn and Uranus. All other flight conditions are referred to as cruise nodes.



## Predict Trajectory

The JCL used to predict trajectory information based on existing data is contained in the data set members V1PREDCT and V2PREDCT. These members are located in the data set SB#VG.TRAJ.CNTL .

The members contain code after the FT05F001 statement line for making the data request. The code will require the time range and word locations for the period requested. The time range is specified with the variables FROM= and TO=. The format is year, month, day and hour. The WORDS= variable will be the byte range of the record that contain the data.

A printout is produced that contains the proper column headings and the data.

## STANDARD PRODUCTION ANALYSIS

The process of production analysis consists of extracting data from a data base, (a flux job), listing the data and plotting the data, (a plot job). The data is extracted as either flux or spectrum.

Flux data is the averaged energy of a given particle for some time period. Spectrum data is the averaged energy for a group of particles of a given electrical charge. See section 3 ~~or~~ of reference 1 for an in depth discussion of the analysis of data.

Production analysis is done on an annual bases or as requested by an investigating scientist. The annual analysis occurs periodically in the year. The most common analysis to be done is the monthly analysis. Many CLISTs exist to submit these jobs. Individual jobs are usually submitted via the editing of JCL and executing CLISTs that reference the JCL. The production analysis is a two stage process. The first stage is to extract the requested data from the encyclopedia for the desired space craft. This step will produce a listing and possibly a data set.

The next stage of the process is to plot the extracted data. When the production analysis is finished, the listings and plots should be turned over to the requesting scientist.

The following sections will discuss CLISTs and JCL used to do annual monthly requests, annual requests by investigating scientists and individual requests by an investigating scientist.

## Monthly Plot Flux MONFLX

EX 'SB#VG.LIB.CLIST(MONFLX)'

The first step in the monthly analysis is carried out by Monflx. In this step, the flux data sets are produced. The data criteria for the monthly analysis has been specified by the investigating scientist. MONFLX is used to start the monthly production analysis. When executed, MONFLX will give the data technician the option to recover the data sets required to submit flux jobs.

The data technician will then be given the option of submitting all flux jobs at run class F. If the data technician chooses not to submit all flux jobs, MONFLX will display a menu of choices. The choices will be to change the run class, submit flux jobs by space craft or quit the clist. If the data technician chooses to submit flux jobs by individual space craft, the data technician will be given the choice of submitting individual flux jobs for that space craft. When the data technician has chosen an option, MONFLX will submit the job and return to the menu. The data technician then has the options as described above.

If the data technician chooses to submit all jobs at run class F, MONFLX submits all the monthly flux jobs and then terminates. The data technician can then verify that the jobs executed properly, usually, the following morning.

MONFLX will produce listings as follows:

- 1 Voyager-1 daily averages.
- 2 Voyager-1 twenty six day averages.
- 1 Voyager-2 daily averages.
- 2 Voyager-2 twenty six day averages.
- 1 ISEE-3 twenty six day averages.
- 1 Pioneer-10 twenty six day averages.
- 1 Pioneer-10 daily averages.
- 1 Pioneer-11 daily averages.

The twenty six day averages listings are currently used to update flux data sets by hand. All listings are presented to the requesting scientist after extraneous papers have been removed.

## Monthly Plots

### MONPLT1

After the monthly flux data sets have been created via MONFLX, the plot jobs may be submitted. MONPLT1 has been set up to submit these plot jobs. The plots are for daily and twenty six day averages of select flux data. The plots will be for the data from one space craft or a comparison of data for two or more space craft. These plots will be for one hundred eighty day periods or ninety day periods. The data technician may also submit the plots for the twenty six day averages, if the flux plot data sets have been updated at this time.

MONPLT1 is an automatic CLIST and will only prompt for permission to plot the twenty six day averages. The data technician will be required to press the enter key when the screen is full so that the CLIST may continue execution. After all the plot jobs have been submitted, MONPLT1 will terminate.

When the plots have executed properly, the data technician should separate the plots and present them to the requesting scientist.

## 26 DAY AVERAGES MONTHLY PLOTS

### MONPLT2

After the flux data sets for the twenty six day averages have been updates, MONPLT2 should be executed. MONPLT2 may be executed via MONPLT1 or by the data technician. MONPLT2 is automatic and will only submit the plot jobs after verifying that the user wishes to submit the plot jobs.

The plots are of data averaged over twenty six day intervals. The time period plotted is over eight years and the data is a comparison between space craft. When the plots have successfully completed, the data technician should separate the sheets and present the plots to the requesting scientist.

## Tape Back Up Procedures Overview

A back up tape cartridge is made from library and encyclopedia tape cartridges. Two types of back ups are done, monthly and archive. Monthly back ups are done after the data technician has finished production for the month. Archives are made when a library or encyclopedia tape cartridge is full. A full tape cartridge condition is different for library and encyclopedia tape cartridges. See LIBCOPY1 and ENCOPY1 for further information on tape cartridge full conditions.

When an archive is done, the monthly back up is also done for the encyclopedia or library tape cartridge. The monthly back up tape cartridge is removed from the Tape Library System and stored in building 2, room W20. The archive back up is removed from the Tape Library System and sent to tape staging and storage. See tape staging and storage for further information. The original tape cartridge is kept in the Tape Library System.

After the tape cartridge is backed up, the data technician must enter the relevant data about the tape cartridge into V1BKINFO or V2BKINFO, depending on the Voyager space craft. These members may be found in the data set SB#VG.LIB.CNTL.

### Back Up Tapes

The following nomenclature is used in this section.

ID - 1 for Voyager-1, 2 for Voyager-2.

0 - 01 through 99 for the tape serial number.

The monthly back up tape cartridges will have a volume serial number on the label that looks as follows. For the library tape cartridge, MIDLB0, and for the encyclopedia tape cartridge, MIDEBO. The archive back up tape cartridges will have a slightly different volume serial number. Archives for the library tape cartridge will have VIDLB0 as a serial number, and for the encyclopedia tape cartridge, VIDEBO. Typical examples are V2LB44 and V1EB98.

After the face label has been attached, the data technician must verify that the white dot on the write protect thumb wheel is visible. This will allow the tape cartridge to be written to. The data technician should then assign the tape cartridge to the Tape Library System. See TLSUPDTE for information on this procedure.

When the tape cartridge has been physically hung in the tape library, a label job must be submitted for the tape cartridge. See LIBCOPY1 and ENCOPY1 for particulars on tape cartridge labelling.

## BACKUPS

SB#VG.LIB.CLIST(BACKUPS).

The following parameters are used in this section.

ID - 1 for Voyager-1, 2 - for Voyager-2.

I - 01 through 99 for back up volume serial numbers.

O - 001 through 999 for library or encyclopedia tape cartridge serial numbers.

FILES - 003 through 999 for the number of library files to copy.

CLASS - the run class. A is the default.

TYPE - the operation type. M is the default.

m - Monthly back up.

a - Archive back up.

rm - Restore monthly back up.

ra - Restore archive back up.

BACKUPS is a clist used to execute multiple back up and recovery jobs. Each line is an independent execute statement, with an associated parameters list.

For the library tape cartridges, the line would be as follows.

EX 'SB#VG.LIB.CLIST(LIBCOP1)' 'ID I O FILES CLASS(#) TYPE#'

The parameters ID, I, O and FILES are required information for LIBCOP1 to run. CLASS and TYPE will default to CLASS(A) and TYPE(M) if they are not specified.

For encyclopedia tape cartridges, the line would appear as follows.

EX 'SB#VG.LIB.CLIST(ENCOP1)' 'ID I O CLASS(#) TYPE#'

The parameters ID, I and O are required information for ENCOP1 to run. CLASS and TYPE will default to CLASS(A) and TYPE(M) if they are not specified.

The choice of run class and operation type is at the discretion of the data technician. All tape cartridges involved in the back up session must be present in the Tape Library System. The back up tape cartridges must be labelled properly and write enabled. See ENCOP1 and LIBCOP1 for further information.

### EXAMPLES:

To submit a monthly back up for Voyager-2 encyclopedia tape cartridge M2E395 to the back up tape cartridge M2EB50 at run class A.

EX 'SB#VG.LIB.CLIST(ENCOP1)' '2 50 395 CLASS(A) TYPE(M)'

or

EX 'SB#VG.LIB.CLIST(ENCOP1)' '2 50 395'

To submit an archive back up of Voyager-1 library tape cartridge M1L003 to archive tape cartridge V1LB03 at run class F

for 20 files.

EX 'SB#VG.LIB.CLIST(LIBCOP1)' '1 03 003 60 CLASS(F) TYPE(A)'

Note that the number of files, 20, is multiplied by 3.



## ENCOPY1

EX 'SB#VG.LIB.CLIST(ENCOPY1).

ENCOPY1 will use JCL located in the data set SB#VG.LIB.CNTL to copy a source and target encyclopedia tape cartridge. The copy job will be submitted using the information given in the parameters list.

Execution is as follows, using the proper command.

EX 'SB#VG.LIB.CLIST(ENCOPY1)' 'ID I O CLASS(X) TYPE(#)'

where

ID = 1 for Voyager-1, 2 for Voyager-2.

I is the three digit serial number of the source encyclopedia tape cartridge.

O is the two digit serial number of the target encyclopedia back up tape cartridge.

X is the run class. Defaults to A if not specified.

# is the copy job type to be run.

ENCOPY1 is executed on a monthly bases. This is usually after the data technician is done with production for the month. The source tape cartridge is determined by consulting the appropriate Voyager log. A new encyclopedia tape cartridge is produced each time ENCMRG is executed successfully. The latest encyclopedia tape cartridge produced is the source tape cartridge for the back up procedure. An encyclopedia monthly back up tape cartridge need only be labelled once. (See labeling below.) The same monthly back up tape cartridge is used each month, until a tape cartridge full condition is observed for the encyclopedia block section of the Voyager log. A tape cartridge full condition exists when the current encyclopedia tape cartridge serial number still appears in the encyclopedia block section of the Voyager log after an ENCMRG job has been successfully executed. In other words, the encyclopedia serial number becomes a permanent part of the encyclopedia block listing. At this time, a final encyclopedia monthly back up is done along with an archive back up. The full encyclopedia tape cartridge remains in the Tape Library System. The monthly back up tape cartridge is removed from the Tape Library System and stored in building 2, room W20. The archive back up tape cartridge is removed from the Tape Library System and sent to tape staging and storage. See tape cartridge staging and storage for information on sending tapes.

The run class can be N for immediate run, A for normal run, E for evening run or F for night runs. The type can be M for monthly back up, A for an archive back up, RM for a recovery from a monthly back up or RA for a recovery from an archival back up. Note that recovery jobs copy from the back up tape cartridge to a new encyclopedia tape cartridge. The encyclopedia tape cartridge should be labelled SL and have a volume label serial number like the following, M-ID-E-I. Example M1E001 for Voyager-1.

To recover a tape cartridge, a new, labelled tape cartridge must be in the Tape Library System. The tape cartridge must have

an SL label written on the tape. ENCOPY1 is then executed with TYPE set to RM for recovery from a monthly type back up or RA for recovery from an archive type back up.

### Labeling

To label a back up tape cartridge, execute the following command. The terms ID and O are the same as above. Volume labels are M-ID-EB-O for monthly back up tape cartridges and V-ID-EB-O for archive tape cartridges. Example M2EB05 for Voyager-2.

```
LAB MIDEBO,LABEL(SL),DEN(4),TUNIT(3480)
```

The back up tape cartridge need only be labelled once. The monthly back up tape cartridge may be written to many times. The archive tape cartridge is written to once.

#### EXAMPLES:

To submit a label job for monthly back up tape cartridge 03 for Voyager-1.

```
LAB M1EB03,LABEL(SL),DEN(4),TUNIT(3480)
```

To do a monthly back up of Voyager-2 tape cartridge M2E395 to tape cartridge M2EB50 at class A.

```
EX 'SB#VG.LIB.CLIST(ENCOPY1)' '2 395 50 CLASS(A) TYPE(M)'
```

or

```
EX 'SB#VG.LIB.CLIST(ENCOPY1)' '2 395 50'
```

To recover archive tape cartridge V2EB50 to Voyager-2 tape cartridge M2E395 at run class F.

```
EX 'SB#VG.LIB.CLIST(ENCOPY1)' '2 395 50 CLASS(F) TYPE(RA)'
```

## LIBCOPY1

SB#VG.LIB.CLIST(LIBCOPY1).

Using JCL located in SB#VG.LIB.CNTL, LIBCOPY1 will build a single tape cartridge copy job from the five parameters given in the parameter list of the execute statement. This job will be submitted to the system at the run class specified, but will default to class A if no run class is specified. If no type is specified, the monthly back up copy job will be run. LIBCOPY1 is used to make the back ups of the library tape cartridges after production or when the library tape cartridge is full. The library tape cartridge stays in the Tape Library System. The monthly stays in the Tape Library System until a final monthly back up is done. The monthly back up tape cartridge is then removed from the Tape Library System and stored in building 2, room W20. The archive back up tape cartridge is removed from the Tape Library System and sent to tape staging and storage. See tape staging and storage for shipping details.

The execution of LIBCOPY1 is as follows,  
EX 'SB#VG.LIB.CLIST(LIBCOPY1)' 'ID I O FILES CLASS(X) TYPE(#)'  
where

ID = 1 for Voyager-1, 2 for Voyager-2.

I is the three digit serial number of the source tape cartridge to be backed up.

O is the two digit serial number of the target back up tape cartridge.

FILES is three times the number of library files the data technician wishes to back up. See files below.

CLASS is the run class selected by the data technician. Defaults to A if no run class is given.

TYPE is the copy job type, back up or recover.

TYPE(A) is used to make the archive back up of a full library tape cartridge. Only one library back up tape cartridge is used for a library tape cartridge. The library archive back up is done when the library tape cartridge is full. A final library back up is done at this time also. The monthly is executed by setting TYPE to M, TYPE(M). See files below for more information on when the library tape cartridge is full.

CLASS can be set to N for immediate execution, A for normal execution, E for evening execution or F for night execution.

### Tape Labeling

All label jobs are run a class L. The back up tape cartridge must be labelled as an NL tape cartridge. If the tape cartridge is a new tape cartridge, then the label job is executed as follows for a monthly back up. The terms I, ID and O are the same as described above. The volume formats are M-ID-LB-O and V-ID-LB-I. Examples are M2LB01 and V1LB01.

The archive back up tape cartridge would be the same, except

VIDLBO would be used instead of MIDLBO.

If an existing back up tape cartridge is to be used, then the tape cartridge must be re-labelled. This is done as follows.

```
EX LABEL VOL=MIDLBO,OLDVOL=MIDLI,LABEL=NL,DEN=4,TUNIT=3480
```

The same library back up tape cartridge is used over until the library tape cartridge is full. Each monthly back up must be preceded by a label job for the back up tape cartridge.

### Files

LIBCOPY1 creates three copies of a library file on the back up tape cartridge. This redundancy is done as a safe guard against file corruption on the back up tape cartridge. When the data technician wishes to back up a library tape cartridge, the total number of library files must be multiplied by three. This tells the copy program how many files will be written to the back up tape cartridge. To be sure of how many files are to be backed up, the data technician should run a tape cartridge scan on the source tape cartridge. This will reveal how many files are on the library tape cartridge. The Voyager log will not always show the true number of files on a library tape cartridge.

A library tape cartridge is said to be full when EDRSAVE starts writing files to a new library tape cartridge. This is indicated in the Voyager log when the library serial number increments and the file number roles over to one. At this time the data technician should make a last monthly back up and an archive back up of the library tape cartridge.

### Recover

If a library tape cartridge has been damaged, the data technician may recover from the monthly back up or the archive back up tape cartridge. The target tape for the recovery process is a new library tape cartridge. This tape cartridge will have the same volume label serial number as the damaged tape cartridge, but it will have an NL label job run on it before use in the recovery.

To recover from a back up tape, use LIBCOPY1 as follows:

```
EX 'SB#VG.LIB.CLIST(LIBCOPY1)' 'ID I O FILES CLASS(X) TYPE(#)'
```

The parameters will be the same as described above. If the back up tape cartridge to be recovered from is a monthly back up then TYPE will have RM substituted for #. If the back up tape cartridge is an Archive, TYPE will have RA substituted for #.

### EXAMPLES:

To submit a label job for a new Voyager-2 tape cartridge M2L041 at run class L.

```
LAB M2L041,LABEL(SL),DEN(4),TUNIT(3480)
```

To submit a label job for a new Voyager-2 archive tape cartridge V2LB41 at run class L.

```
LAB V2LB41,LABEL(NL),DEN(4),TUNIT(3480)
```

To re-label a monthly back up tape cartridge that already exists for Voyager-2 at run class L.  
EX LABEL VOL=M2LB41,OLDVOL=M2L041,LABEL=NL,DEN=4,TUNIT=3480

To submit a monthly back up of Voyager-1 tape cartridge M1L040 with 30 files to M1LB40 at run class E.

EX 'SB#VG.LIB.CLIST(LIBCOP1)' '1 040 40 90 CLASS(E) TYPE(M)'

or

EX 'SB#VG.LIB.CLIST(LIBCOP1)' '1 040 40 90 CLASS(E)'

To restore from archive tape cartridge V1LB03 with 90 files to tape cartridge M1L003 with 30 files at run class A.

EX 'SB#VG.LIB.CLIST(LIBCOP1)' '1 003 03 30 CLASS(A) TYPE(RA)'

or

EX 'SB#VG.LIB.CLIST(LIBCOP1)' '1 003 03 30 TYPE(RA)'

## Restoring back ups

When a library or encyclopedia tape cartridge is damaged, the tech must recover as much information as possible. The monthly back up tape cartridge should be used to recover data. If the monthly back up tape cartridge is also damaged, the archive back up tape cartridge should be used, if available.

The damaged tape cartridge should be replaced with a new tape cartridge, and the tape cartridge should have the same face label volume serial number as the damaged tape cartridge. The new tape cartridge should have a label job done on it, with NL for a library tape cartridge and SL for an encyclopedia tape cartridge.

If the label job executed correctly, either ENCOPY1 or LIBCOPY1 should be run with the correct TYPE. Use RM for recovery from a monthly back up or RA for recovery from an archive back up. The rules for a recover job are the same as for copy jobs described in the sections for LIBCOPY1 and ENCOPY1. For further information, see ENCOPY1 and LIBCOPY1.

## One Way Light Time

The One Way Light Time is the time light takes to travel from voyager to an earth receiving station. A table of One Way Light intervals is used by ENCGEN and RUNEDIT to check that data is received within a specified time gap for the voyager space craft. The intervals used in the tables are twelve hour intervals. Two tables exist, SB#VG.V10WLT.DATA for voyager 1 and SB#VG.V20WLT.DATA for voyager 2.

A One Way Light Time tape is received from JPL. This tape usually has the One Way Light Time tables in two files. Note that the tape format changes with most tapes sent. The data technician should first assign the tape to the Tape Library System and then hang the tape. A tape scan should be run on the tape and the printout should be looked at by the lead programmer or task leader.

The following JCL and CLIST routines will allow the data technician to: list the tape contents, update the One Way Light Time tables, list the contents of the One Way Light Time tables or hand update the One Way Light Time tables.

When the data technician is finished with the One Way Light Time tape, the tape should be stored in building 2, room W20.

## V1OWLLST and V2OWLLST

About every One Way Light Time tape that has come from JPL has had some variation in the tape format. The data technician should do a tape scan of the new One Way Light Time tape. This scan should be reviewed by the task leader or lead programmer. Please read the data set member SB#VG.LIB.CNTL(OWLTTAPE).

SB#VG.LIB.CNTL(V1OWLLST) and (V2OWLLST) will list the times to be processed into a One Way Light Time table. The listing will be placed in a disk data set for review.

If the JCL fails, be suspicious of the format of the One Way Light Time tape. The UNIT=, PGM= and VOL=SER= parameters in the JCL may require changing. The VOL=SER= should be set to the tape volume label. The UNIT= should be set to the tape type. The PGM= will be set to ZTOEB CD or TOEB CD. Trial and error is how the data technician determines which of these programs to use. These programs are discussed more in OWLTV1 AND OWLTV2.



## OWLTPRE

Packed Univac Field Data is a format encountered on the One Way Light Time tapes received from JPL. SB#VG.LIB.CNTL(OWLTPRE) is the JCL used to convert the data from the above format to a format used by IBM computers at the G.S.F.C. The format for IBM is called EBCDIC. The converted data is stored into a temporary data set on a disk pack.

To use OWLTPRE, the JCL cards for FT10F001 and FT20F001 must be edited. On the FT10F001 card the UNIT= variable may require changing to indicate the tape type. The VOL=SER= variable should be set equal to the tape volume label. On the FT20F001 card the DSN= variable should be set to a temporary data set name chosen by the data technician.

After the data technician has completed the conversion process, the JCL member SB#VG.LIB.CNTL(OWLTV1N) should be submitted for the temporary data set.

## OWLTREAD

SB#VG.LIB.CLIST(OWLTREAD) will list the last entries in the selected one way light time table. OWLTREAD will prompt for the table to use. The table name should be enclosed in single quotes. The next prompt will be for a printout of the end of the table. The reply to this is in the Y/N format. The final prompt will be for the start date, entered in the YY,MM,DD format.

The information will scroll down the screen. Each line will be at an interval of twelve hours. The line consists of a list of one way light intervals.

## OWLTV1 and OWLTV2

The format of the files on a One Way Light Time tape will not be in a format exceptable to the IBM 3081. The IBM uses a format called EBCDIC for data coding. Because of the varying storage methods used by JPL, two programs are used to convert the data to EBCDIC. These two programs are SB#VG.LIB.CNTL(ZTOEBCD) and (TOEBCD).

The JCL in SB#VG.LIB.CNTL(OWLTV1) will do the data conversion and build a new One Way Light Time table. OWLTV1 is used for Voyager-1. The JCL in SB#VG.LIB.CNTL(OWLTV2) will do the same thing as OWLTV1. The difference between OWLTV1 and OWLTV2 is that OWLTV2 is for Voyager-2.

To use the data set members, variables must be set and a trial run of the JCL must be made. On the FT10F001 card the UNIT= and VOL=SER= should be set to the proper tape type and tape volume label name. The job should be submitted at this time.

If the job fails, the other conversion program should be used. On the SOURCE.SYSIN card, the member must be changed in SB#VG.LIB.CNTL(MEMBER). This may be from (ZTOEBCD) to (TOEBCD) or vice versa.

If the job runs successfully, a new One Way Light Time table will be produced and a print out should be provided. The print out will be a listing of the new One Way Light Time table.

*With tape N2215 OWLTPRL  
should be run before VIEWLT*

## OWLTV1N

SB#VG.LIB.CNTL(OWLTV1N) will use the temporary data set created by SB#VG.LIB.CNTL(OWLTPRE) to make a new One Way Light Time table. This JCL is written to use a disk pack as the source for the data set, instead of a tape.

To use OWLTV1N, the DSN= variable on the first FT10F001 card must be set to the temporary data set name chosen by the technician. The DSN= variable on the second FT11F001 card must be set to the data set name of the One Way Light Time table to be generated.

If the job fails, the technician should submit the job again after changing the SYSIN card variable, DSN=, to TOEBCD or ZTOEBCD. Which of these programs to use depends on which one failed. If the card reads DSN=SB#VG.LIB.CNTL(TOEBCD), then ZTOEBCD should be used.

## V1ENXX V2ENXX

SB#VG.LIB.CNTL(V1ENXX) and (V2ENXX) are used with SB#VG.LIB.CNTL(ENXXXX) to hand update the One Way Light Time tables. Each member will contain a list of SCET and ERT time pairs. These times are obtained from the FDSC/TIME CORRELATION sheets sent in the weekly update packages. The format is one SCET and ERT pair per line. Each line differs from the previous line by twelve hours. Each of the times has the format: julienne date, hour, minute, second. fraction.

An example of the FDSC/TIME CORRELATION sheet for date 363 follows:

```
MOD16:60
26116:00   SCE   363/00:37:11.305
           ERT   363/05:24:34.586
```

The same data in V1ENXX OR v2enxx is:  
00:37:11.305 05:24:34.586

To determine what date to start with, use OWLTREAD. List the end of the target One Way Light Time table and start at the next 12 hour interval. When enough entries are typed into these members, ENXXXX is executed to place the data into the appropriate One Way Light Time table. The One Way Light Time table to be updated should be backed up first.

## ENXXXX

SB#VG.LIB.CLIST(ENXXXX) will add the times listed in SB#VG.LIB.CNTL(V1ENXX) or (V2ENXX) to SB#VG.V1OWLT.DATA or SB#VG.V2OWLT.DATA. These are the One Way Light Time tables.

To use ENXXXX, the data technician should first back the target One Way Light Time table up. When ENXXXX is executed, the data technician will be required to input three data set names. These names must be fully qualified. This means that the data set names must be complete.

The first prompt is requesting the data set with the new times, either V1ENXX or V2ENXX. The second prompt is requesting the One Way Light Time table name to be updated. The third prompt will request the new One Way Light Time table data set name. This name should not be the same as the old One Way Light Time table. The new One Way Light Time table is created in a temporary data set.

After the new One Way Light Time table is created, the data technician should use OWLTREAD to check the new One Way Light Time table. Once the data technician has verified the data in the new One Way Light Time table, the new data set should be copied over the old One Way Light Time table. When this procedure is finished, the production may continue.

## References

1. Data Processing System Guide for the Voyager-1 and -2, and the ISEE-3 Cosmic Ray Experiments.  
CSC/TM-81/6183
2. Voyager Log - Master Copy.
3. IBM MVS/TSO Users Guide.
4. PIONEER/HELIOS & VOYAGER/ISEE Reports  
Cosmic Ray DS Management Document.
5. Data set 'SB#IC.USERGIDE.TEXT'

Data sets used in monthly analysis production.

SB#VG.LIB.CLIST(MONPLT1)	Execute 3.
SB#VG.LIB.CNTL(\$MON1)	Stab submit 1.
SB#VG.LIB2.PLOT(JC#VGN)	
SB#VG.LIB.CNTL(FLUXPLT1)	
SB#VG.LIB.PLOT(\$MONFLX1)	
SB#VG.LIB.CNTL(\$MON2)	Stab submit 2.
SB#VG.LIB2.PLOT(JC#VGN)	
SB#VG.LIB.CNTL(FLUXPLT2)	
SB#VG.LIB.PLOT(\$MONFLX2)	
SB#VG.LIB.PLOT(\$MONPL1)	
SB#VG.LIB.PLOT(\$\$MONPL1)	
SB#VG.LIB.PLOT(\$\$TPLOT).	
SB#VG.LIB.CLIST(MONPLT2)	Execute 12.
SB#PR.LIB.DATA(\$26PF)	Stab submit 4.
XRPAS.MCDOXY01.DATA(JC#PRN)	
SB#PR.LIB.CNTL(AFLXPROC)	
SB#PR.LIB.DATA(SP268889)	
SB#PR.LIB.CNTL(SP26BINA)	
SB#VG.LIB.DATA(\$26V1)	Stab submit 5.
XRPAS.LIB.CNTL(JC#VGN)	
SB#VG.LIB.CNTL(FLUXPLOT)	
SB#VG.LIB.DATA(MCD26V19)	
SB#VG.LIB.DATA(\$26V2)	Stab submit 6.
XRPAS.LIB.CNTL(JC#VGN)	
SB#VG.LIB.CNTL(FLUXPLOT)	
SB#VG.LIB.DATA(MCD26V29)	
SB#IC.LIB.DATA(\$26IC)	Stab submit 7.
XRPAS.LIB.CNTL(JC#ICN)	
SB#IC.LIB.CNTL(FLUXPLTN)	
SB#IC.LIB.DATA(IC26DAVG)	
XRPAS.MCDOXY01.DATA(\$\$JCLV1)	Stab submit 8.
XRPAS.MCDOXY01.DATA(JC#VGN)	
XRPAS.MCDOXY01.DATA(VFLXPLT)	
XRPAS.MCDOXY01.DATA(V1OX269)	
XRPAS.MCDOXY01.DATA(VBINS)	
XRPAS.MCDOXY01.DATA(V1)	
XRPAS.MCDOXY01.DATA(\$\$JCLV2)	Stab submit 9.
XRPAS.MCDOXY01.DATA(JC#VGN)	
XRPAS.MCDOXY01.DATA(VFLXPLT2)	
XRPAS.MCDOXY01.DATA(\$V2OX269)	
XRPAS.MCDOXY01.DATA(VBINS)	
XRPAS.MCDOXY01.DATA(\$V2)	
SB#PR.LIB.DATA(\$P10LOW)	Stab submit 10.
XRPAS.MCDOXY01.DATA(JC#PRN)	
XRPAS.MCDPF001.DATA(FLUXPLT3)	
SB#PR.LIB.DATA(P10LOW)	
SB#PR.LIB.DATA(\$P11LOW)	Stab submit 11.
XRPAS.MCDOXY01.DATA(JC#PRM)	
XRPAS.MCDPF001.DATA(FLUXPLT3)	
SB#PR.LIB.DATA(P11LOW)	



SB#VG.LIB.DATA(V1V2RATE)  
SB#VG.LIB.DATA(V1024A)  
SB#VG.LIB.DATA(V3070A)  
SB#VG.LIB.DATA(V180450A)  
SB#VG.LIB.DATA(V3056P)  
SB#VG.LIB.DATA(V140220P)  
SB#VG.LIB.DATA(PVIRATE)  
SB#VG.LIB.DATA(PVI120PR)  
SB#VG.LIB.DATA(PVI185AL)  
SB#VG.LIB.DATA(PF4AV24F)  
SB#VG.LIB.DATA(P6AV26BF)  
SB#VG.LIB.DATA(PF5AV25F)  
XRPAS.MCDOXY01.DATA(PLTVVOXY)

SB#PR.LIB.DATA(PGLOW)  
XRPAS.MCDPLT03.DATA(\$\$MULTYR)  
XRPAS.MCDPLT03.DATA(\$\$PL38D4)

Execute 13.

SB#PR.LIB.DATA(PFLOW)  
XRPAS.MCDPLT03.DATA(\$\$MULTYR)  
XRPAS.MCDPLT03.DATA(\$\$PL38D4)

Execute 14.